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THE NATURE CONSERVANCY

COMMITTEE FOR ENGLAND

Moor House, Westmorland: 2nd Progress Report 1960/61

by M. Rawes and R. J. Elliott

The Revised Management Plan was approved by the Committee on 22nd October, 1959 (E/Min/59/4: Item 5). This, the second progress report covers the period 1st October 1960 - 30th September, 1961.

GENERAL

The staff in post on 30th September 1961 were M.Rawes (Officer-in-Charge), E.J. White (Forestry), D. Welch (Assistant to M. Rawes), T.L. Hodgson (Warden), Mrs. E. Steele (Housekeeper) and R.W. Martin (Estate Worker).

Following the resignation of Dr. V.M. Conway and the appointment of Mr. J.B. Cragg as Director, Merlewood, a review of the scientific programme has been instituted. This re-assessment has yet to be completed but with an expected increase in future scientific output improved facilities will have to be provided. Estimates submitted to Headquarters for the next financial year have taken into account the very urgent need to increase estate staff and to provide necessary improvements to laboratory and office accommodation.

A. SCIENTIFIC RESEARCH

The following reports have been submitted:-

33 I. Climatology - E. White

Observations continue to be made.

34 II. Vegetation

(a) Measurement of changes in vegetation and soil following the removal of grazing - M. Rawes

A more intensive study of the chemistry of the soil has been started so that our foundation data may be more complete. Examination of the vegetation on quadrats charted in 1955 showed that in some cases there had been surprisingly little change. On Knock Fell the vegetation over the deeper soils has altered, for instance Juncus squarrosus has given ground to grass spp.; additionally the build up of slowly decaying litter is extensive. D.Welch has recorded the charts for the Reserve Record.

This is one of the experiments that is liable to be modified, and it is possible that some of it may form a part of a more general ecological study of the effects of sheep grazing on vegetation and soil.

(b) The balance between the loss of soil nutrients through leaching and through removal of vegetation by grazing, and the replenishment through the action of natural soil forming processes - M. Rawes

This experiment is temporarily in abeyance.

(c) An experiment in raising the productivity of limestone grassland - M. Rawes

This year's "hay" yield from the pasture enclosure - the test site - shows there to be a continuing rise in its productivity. The exclusion of sheep grazing, small annual manurial dressings and hay cropping remain the principal management tools. A few plants of species hitherto restricted to the meadow have now been recorded in the enclosure. They are Alopecurus pratensis, Helictotrichon pubescens and Trisetum flavescens.

(d) The establishment of natural grassland communities - M. Rawes

This is continuing.

(e) The establishment of high-level woodland - E.J. White

Tree growth has continued satisfactorily during the past year. The mild winter caused rather less damage than usual, and the Scots Pine at Green Hole, though in some cases damaged by the movement of snow-drifts, made good recovery. Some trees, however, remain badly mis-shapen.

Very few sawfly were seen on the pines and birches this year. Frequent inspections were made and protective spraying carried out. A few sawfly attacked alder; the first time this has been noted.

During the spring a new enclosure, at the west end of the pasture, was planted with a variety of tree species. This area is a fairly uniform site of redistributed peat, well exposed to the west. The objects of this planting are to try out a windfirm shelterbelt type of design, and to use a uniform planting of mixed species for comparisons with the Anderson's groups in the other plots. It is felt that the new system may provide a more intimate mixture and sheltering effect by the hardier species, and an earlier complete covering of the ground. Several exotic species were planted throughout the plot, which will be thinned out later after the native species have benefitted from their shelter. A windform edge of pines was planted. Some spaces have been left for later additions.

(f) Plant nutrition studies on peat - A.J.P. Gore

1. A study of the productivity and sensitivity to different cropping regimes of cotton grass swards growing on blanket peat - Bog Hill.

This is continuing.

2. Further studies on the role of mineral nitrogen in the growth of Molinia caerulea on high-level blanket peat.

This experiment is being carried out on peat at Moor House (Summit of Cottage Hill) and at Deer Dike Moss. The objects of this experiment include:

(i) Estimation of the role of inorganic nitrogen in promoting maximum growth rates at Moor House.

(ii) Estimation of the role of all the important macro and micro mineral nutrients in relation to nitrogen nutrition.

These estimations are to be made in terms of relative growth rates which can in turn be broken down into leaf area ratios and net assimilation rates. Root estimations are being attempted for the first time in these experiments and field thermograph installations are measuring soil and air temperature and wet and dry bulb temperature in the immediate vicinity of the growing plants.

This experiment is a direct continuation of the Molinia/Dactylis experiment referred to in the previous report. On this occasion only Molinia is being used.

40 (g) A vegetational survey of the Moor House N.N.R - Prof. D.H. Valentine.

Eddy's work on the vegetation of the Reserve has been actively continued. The primary survey of the whole area has now been practically completed, and work is in progress on the description and characterisation of the various plant communities. Field maps of about half the Reserve have been produced. Soil samples have been taken from selected communities; and certain of the more complex areas are being mapped and studied in detail, especially the erosion - recolonisation complexes on the blanket peat, and the high-level springs and flushes.

A provisional list of plant associations or noda was drawn up in the spring of 1961. This is comparable with the lists already produced by Poore, McVean and Ratcliffe for Scottish vegetation; eventually the resemblances and differences between the Pennine and Scottish communities will be analysed.

41 (h) Long term investigation on effects of burning - Dr. R. J. Elliott.

The long term burning experiment, in which four blocks of vegetation on Hard Hill were burned in 1954 to bring them to a reasonable degree of uniformity, were analysed botanically with the assistance of a student from University College, London. Soil and vegetation samples were collected for chemical analysis.

This work was carried out in September 1961 and the results have not yet been examined. The decision as to whether or not to burn in 1962 the plots scheduled for short cycle rotations will to some extent depend on these results. Balance is necessary between (a) the experimental need to proceed as rapidly as possible and (b) the fact that few, if any, landowners would consider burning the heather in its present immature condition.

42 III Fauna - Prof. J. B. Cragg.

Students from Durham Colleges, under the direction of Prof. J.B. Cragg, have continued to make full use of the Reserve for ecological studies.

(i) W. Block has begun a study of the mites of moorland soils and is making good progress with taxonomic and quantitative studies on this very important ecological group.

(ii) W.G. Hale has continued his studies on the Collembola and has worked out the life histories of some moorland species. His quantitative work is revealing differences in the collembolan faunas of different vegetation types at Moor House and he is obtaining reliable data on seasonal changes in numbers and in biomass. He has developed an extraction device which may prove of general value for extracting micro-arthropods from peat.

(iii) Miss J. Stones as temporary research assistant to Prof. J.B. Cragg has helped with earthworm counts and has made a promising start with the taxonomy of moorland Enchtraeidae. So far her work indicates some 18 species of which several have, in all probability, not been described.

(iv) J.B. Whittaker is investigating the life histories, numerical abundance and micro-climatological requirements of Cercopidae (Cuckoo-spit insects.) These, with certain other Homoptera, form an important part of the fauna on the vegetation layer of certain moorland sites.

43 IV. Hydrology - A.J.P. Gore.

The recording of run-off data from the weirs installed by Dr. V.M. Conway is being continued with a few minor modifications. It is planned to continue the Syke Hill (moor-gripped but not burnt) catchment measurements for a further year on a full-time basis thus providing 5 years continuous readings. Thereafter readings will be taken periodically on a long-term basis and for comparison purposes with other installations. The Burnt Hill Catchment has been modified to take readings from the eroded section only, these will provide preliminary data on the behaviour of water run-off from a heavily dissected peat area.

V. The list of research projects in the Management Plan /E/M/59/51 (3)(j)p.20-23/ should be amended as follows:-

(ii) Geology

Completed — Geological survey of the Moor House National Nature Reserve. (Dr. G.A.L. Johnson) (This is to be published as a monograph).

(iv) Zoology

Completed — Population studies on Coleophora alticolella Zell. (Dr.R.C. Reay).

Studies on Protozoa (Dr. O.W. Heal)

A preliminary survey of Brown Trout (Salmo trutta L.) and Bullheads (Cottus gobio L.) in high altitude becks. (Dr. D.T. Crisp).

Studies on Nematodes (W. Banage).

Studies on Moorland Spiders (Dr. J.M.Cherrett)

In progress — Studies on the ecology of moorland Collembola (W.G. Hale).

Ecology of Mites (W. Block).

Ecology of Homoptera with special reference to Cercopids (J.B. Whittaker).

(v) Botany

Completed — The history of the quaternary organic deposits of the Moor House Nature Reserve. (Dr. G.A.L.Johnson and Miss M.E. Johnson).

The role of calcium and phosphate in the growth of Eriophorum vaginatum and Molinia caerulea on blanket peat - Force burn A.J.P. Gore).

The role of calcium and phosphate on the growth of six species on mineral soil exposed by peat erosion - House Hill. (A.J.P. Gore).

The role of nitrogen and phosphate in the growth of Molinia caerulea and Dactylis glomerata on (a) high-level blanket peat and (b) raised moss peat at sea-level - Bog Hill and Deer Dike Moss. (A.J.P. Gore)

Productivity of high-level alluvial grassland of Festuca-Agrostis and Nardus dominated swards in relation to sheep grazing.
(M.Rawes)

In progress A vegetational survey of the Moor House National Nature Reserve.
(A.Eddy under the supervision of Prof. D.H. Valentine).

A study of the productivity and sensitivity to different cropping regimes of cotton grass swards growing on blanket peat - Bog Hill.
(A.J.P. Gore)

Further studies on the role of mineral nitrogen in the growth of Molinia caerulea on high-level blanket peat.
(A.J.P. Gore)

Measurement of changes in vegetation and soil following the removal of grazing.
(M.Rawes).

The establishment of natural grassland communities.
(M. Rawes).

(vi) Land Use

In progress An experiment in raising the productivity of limestone grassland
(M. Rawes)

Long term investigation on effects of burning.
(Dr. R.J.Elliott).

(vii) Hydrology

In progress Studies on selected catchments.
(A.J.P. Gore.

VI. Publications

Bower, M. (1960 Peat erosion in the Pennines. Advanc.Sci. Lond. No. 64: 323-331

Gore, A.J.P. (1961) Factors limiting plant growth in high-level blanket peat. I. Calcium and Phosphate. J.Ecol.49: 399-402.

Gore, A.J.P. (1961) Factors limiting plant growth in high-level blanket peat. II. Nitrogen and phosphate in the first year of growth. J. Ecol. 49 (3)

Heal, O.W. (1961) The distribution of testate amoebae (Rhizopoda: Testacea) in some fens and bogs in Northern England J. Linn. Soc. (Zool.); XLIV: No.298,369-382.

Rawes, M. (1961) The problem of Nardus and its productivity in relation to sheep grazing at Moor House, Westmorland. J. Brit.Grassl.Soc.,16: 190-194.

White, E. (1960) The distribution and subsequent disappearance of sheep dung on Pennine Moorland. J. Anim. Ecol., 29: 243-250.

B. ESTATE WORK

The work of the Warden, T.L. Hodgson, who is largely responsible for routine estate maintenance, has been severely hampered by difficulties in replacing T. Fawcett, the Estate Worker, who retired last November. Four men have held the post for varying periods, and it is clear that recruiting for such a lowly paid post will always be difficult.

(a) Roadworks

Road surface: A mile stretch of the access road, from the Tees cattle grid to north of the Lady Vain grid, was resurfaced by H. Kearton & Son. Cold bitumen emulsion was sprayed on to a gritted surface followed by a coating of grit. This was rolled to produce a water tight surface. Filling of pot holes has been undertaken by the Conservancy staff using bitumen and chippings.

Drainage: An additional three culverts were put through the road.

Bridges: Dipper Bridge has been most satisfactorily reconstructed, giving better approach and a wider road surface on the bridge itself.

A considerable amount of time is lost every winter due to snow drifts blocking the access road and efforts have been made to remove obstacles that are known to encourage drifting. In some places the road has been widened to provide more room for manoeuvre and a trial with snow fences gave some assistance. An angled bulldozer blade was fitted to the tractor, and after some modification and experimentation, was most successful in keeping a clear way.

Trout Beck Track: Mr. R. Beadle contracted to deal with a further obstacle and the Warden has continued to build up the track surface with stone. Heavy rains in the latter part of July and in August undid a certain amount of last year's work and demonstrated the difficulties of providing a vehicular route of any permanency.

(b) Buildings

Necessary repairs were carried out by contract.

Water supply: The flood that caused damage to the Trout Beck Track removed a dam across Rough Sike. This was rebuilt by H. Kearton & Son with the aid of the Moor House staff who were engaged for a week in carrying materials to the site.

(c) Moor Burning

Twenty acres between the River Tees and Hard Hill were burnt during the first week in March. This was one of the earliest times in the year that burning has been carried out by the Conservancy at Moor House.

(d) Hay Meadow

The Conservancy again exercised their option and purchased half a ton of hay from the Warden.

(e) Wardening

Pest control: The Warden and his assistant have continued to control the number of foxes breeding on the Reserve and no complaints have been received from neighbouring farmers and keepers this year. Ten fox cubs were accounted for on the eastern side of the Reserve.

The reappearance of rabbits in sufficient numbers to do considerable damage to trees has caused some concern. Seven rabbits have been killed on the limestone area near the house and rabbit proof netting has been erected around vulnerable tree enclosures.

Wardens records: T.L. Hodgson continues to keep records of day to day events and has maintained notes on the breeding of several bird species. In May a Merlin nested in the Heather moor, on Long Hill. It laid five eggs of which only one hatched. A pair of Willow Warblers have been seen from time to time during the latter part of the summer in the Green Hole tree enclosure.

C. PUBLIC RELATIONS

The number of people visiting the Reserve does not alter appreciably from year to year. More members of the general public use the access road especially on Bank Holidays and fine weekends.

The following official visitors stayed at the Field Station during the year:-

Lord Howick of Glendale
Mr. Charles Elton
Dr. A. de Vos (Guelph, Ontario)
Mr. E.M. Nicholson
Dr. J.F.D. Frazer.

Day visitors included:-

Lord Hurcomb and the Hon. Pamela Hurcomb
Mr. Denzil Freeth(Parliamentary Secretary to the Minister for Science)
Mr. Isserlis (Private Secretary to the Minister for Science).
Professor B.A. Tikhomirov (Head of the Laboratory for the Flora of U.S.S.R., Leningrad).
Professors Cragg & Valentine (Durham Colleges).
Mr. R.E. Boote

(Day visitors, contd:)

Mr. M.P.J. Lynch (Treasury)
Miss M. Fletcher (Exchequer & Audit Department).
Mr. Michie (Forestry Commission, Carlisle)
Mr. F. Pemberton(Forestry Commission, Gilsland).
Mr. R. Lines (Forestry Commission Edinburgh).
Mr. G. Loveless (Forestry Commission,Keilder).
The Master of Arbuthnott

Additionally in September the University College London, Diploma Course in Conservation, spent a full week at the Field Station. The course, under the instruction of Drs. P. Newbould and T.B. O'Connor, numbered nine students. A report of their visit will be prepared by Dr. Newbould for the Reserve Record.

The Committee are asked to note

M. Rawes
R.J. Elliott.

29th November, 1961.